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International regulation of autonomous weapons

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Abstract
The problem of international regulation of autonomous weapons is very complex, so the researcher in this study dealt with the concept of autonomous weapons, their characteristics and the most important thing that distinguishes them from the human combatant. Then the researcher discussed the issue of the extent to which autonomous weapons apply the principles of international humanitarian law, and indicated the most important restrictions of international humanitarian law to which autonomous weapons must be subject .At the end of the study, the researcher dealt with the dilemma of the criminally responsible before the international criminal judiciary for the violations committed by the autonomous weapons. The researcher recommends the need to maintain the operation of autonomous weapons, provided that the final decision related to targeting remains in the hands of the human element. It is also possible to grant complete independence to autonomous weapons with humanitarian and defensive military missions, such as missile defense systems, And robots that provide medical service or even those robots that contribute to providing military and food supplies during military operations, The researcher also recommends the need for concerted international efforts to develop an international treaty that regulates the work of autonomous weapons in a way that does not contradict the provisions of international humanitarian law and international human rights law.

Keywords: autonomous weapons, international humanitarian law, artificial intelligence, international human rights law.

INTRODUCTION

Armed conflicts have emerged since the beginning of creation, as humans used conventional weapons in armed conflicts that depend entirely on the human element, and this situation continued almost until the beginning of the twenty-first century AD, and as a result of technical development, the technological revolution and the emergence of what is called "artificial intelligence". Developed countries began searching for weapons that do not fully rely on the human element during armed conflicts, with the aim of reducing the number of injuries and victims from their armed forces, and the efforts of these countries continued until they reached the production of such weapons, which are called in the contemporary international concept "autonomous weapons" such as systems Air defense, unmanned aerial vehicles, and unmanned boats.

Autonomous weapons have become a recent dilemma facing the international community with all its components, especially in light of the absence of a legal system and international rules regulating the use of such weapons. These weapons rely on artificial intelligence and carry with them a great danger surrounding the rules and principles of international humanitarian law, and the standards of the right to life that are regulated by international humanitarian law, And not only the above, but that these weapons lack the human conscience that the human race possesses, Therefore, these weapons lack human feelings in performing their tasks during armed conflicts, all of which made the jurists of international law and international organizations confused about how to deal with this modern problem. Some jurists and international organizations have called for a comprehensive ban on the use and development of autonomous weapons, while others see the need to restrict the use of autonomous weapons through the introduction of legal rules regulating their use during armed conflicts in line with the rules and principles of international law.

United Nations literature indicates that autonomous weapons raise widespread concerns about the protection of life in war and peace, particularly with regard to the extent to which these weapons comply with the rules of international humanitarian law, and their response to standards for the protection of the right to life under international human rights law. The deployment and use of these weapons is not acceptable at the present time because there is no system of legal accountability for them, and because robots cannot control human life.

Autonomous weapons also raise a dilemma in the possibility of international criminal accountability resulting from their violations of the provisions of international humanitarian law and the rules of international criminal law, and this dilemma embodies who will be subject to international criminal responsibility, is the weapon itself, the programmer, or the human operator of the weapon, this matter will be discussed In this study, clarification of the opinions of jurists to solve this problem.

In this study, we will address the concept of autonomous weapons, their characteristics, advantages, and disadvantages, and then we will explain the most important challenges that this poses to weapons, and the difference between autonomous weapons and human-operated weapons, and then we will show the extent to which these weapons comply with the provisions and principles of international law, and in the end the responsible researcher will explain Criminally based on violations and crimes committed by autonomous weapons, and in the same context, the researcher will rely on the analysis of legal texts and relevant international agreements, and will explain the views of international law jurists and the positions of international organizations.

Methodology:

The researcher relied on the inductive approach in his study, by collecting data and the opinions of jurists and international organizations, analyzing and interpreting them, with the aim of finding legal rules capable of regulating the work of autonomous weapons, and the researcher relied on the descriptive approach in his study to describe the problem of international legal regulation For autonomous weapons, analyzing, evaluating and commenting on the opinions of jurists in this regard.

The nature of autonomous weapons:

The autonomous weapons are no longer a part of science fiction in movies, magazines, and fairy tales. In recent decades, as a result of the great technological development, these weapons have moved from the world of fantasy to contemporary reality, where lethal, self-operating weapon systems have emerged whose programming relies on artificial intelligence, and the following will be explained by the researcher What is meant by autonomous weapons, and it will show the characteristics, advantages and disadvantages of these weapons, and then explain the challenges posed by these weapons and the difference between them and the human combatant.

The concept of autonomous weapons and their characteristics:

There is no doubt that there are many definitions that have been developed to explain the concept of autonomous weapons, some of which have been developed by international organizations, and some of them have been developed by international law jurists and countries, and through these definitions we can identify the characteristics of autonomous weapons, all of the above will be explained in the following follows:

First: What is meant by autonomous weapons:

Until now, there is no unified, comprehensive, and approved definition by the international community of autonomous weapons. However, there are some definitions that have been developed by countries and international organizations, which we seek to mention as follows:

The United States defines autonomous weapons as "systems that, once activated, can identify and engage targets without additional intervention by a human operator" (Shane R Reeves, Ronald T P Alcala & Amy McCarthy,2018,p.105).

While the United Kingdom defines autonomous weapons as "systems capable of understanding intentions and direction at a high level, and through this understanding and awareness, this system is able to take appropriate measures to achieve the desired goal" (UK MINISTRY OF DEFENCE,2018).

Switzerland defined autonomous weapons as "systems capable of carrying out tasks governed by international humanitarian law, by partially or completely replacing humans in the use of force, especially in the targeting cycle" (Government of Switzerland, 2016).

The International Committee of the Red Cross defines autonomous weapons as “autonomous weapon systems choose targets and use force against them without human intervention, After the initial operation or activation of the system of autonomous weapons by a person, the system operates by itself or fires a strike in response to the information received from the surrounding environment received through the sensors, And based on a “general target classification”. This means that the user does not choose, or even know, the exact target or targets and the exact timing and/or location of the use of force resulting from the autonomy of these weapons" (International Committee of the Red Cross,2021,p,2).

The United Nations Special Rapporteur, Christoph Heinz, defined autonomous weapons as "weapon systems capable of selecting specific targets and engaging them, when activated, without the need for additional human intervention" (United Nations,2015,p,1).

Human Rights Watch defines 'human-out-of-the- loop' weapons as those 'capable of selecting targets and delivering force without any human input or interaction', while 'human-on-the-loop' weapons can 'select targets and deliver force under the oversight of a human operator who can override the robots' actions'. Both types can be considered 'fully autonomous weapons' when supervision is so limited that the weapon can be considered 'out-of-the-loop" (B. Doherty,2012,p.2).

One of the researchers defined autonomous weapons as those weapons that are designed automatically and have the ability to make decisions in the battlefield, without human intervention in their work, which is a violation of the rules of international

humanitarian law, and they include killer robots, and automatic weapon systems (Muhammad Abd al-Ridha Nasser and Kazem Abd Ali,2018, pp. 197-224).

While another researcher defined them as automatic or robotic weapon systems, which, once activated and operational, can choose targets and hit them without additional intervention from a human operator, and the main criterion in determining the nature of these weapons is that they have the freedom to choose targets and make the decision to use lethal force (Yasmine Abdel Moneim Abdel Hamid,2020,p.3140).

Through the previous definitions, we see that most of them define self-powered weapons based on the principle of whether or not they depend on the human element. Some of these definitions considered that autonomous weapons do not depend entirely on the human element, and some of them said that they depend partially in their operation on the human element, and others did not resort to the criterion of the human element mainly, such as the definition of the United Kingdom, In addition to the above, we see that these definitions did not mention that these weapons depend in their operation on artificial intelligence technology, which is an essential pillar in making them self-reliant weapons, as these weapons depend on very advanced algorithms that make them able to make decisions and choose targets, For all of this, autonomous weapons can be defined as "a weapon system that relies on artificial intelligence technology using advanced algorithms that help them sense targets and analyze information and data received from the surrounding environment in a way that helps them choose their targets accurately, and thus take the appropriate decision to deal with them, all without the need for intervention, in whole or in part, by the human element.

Second: Characteristics of autonomous weapons:

1. **Independence:** The most important characteristic of autonomous weapons is that they are independent of any human control or intervention, whether in whole or in part. These weapons are capable of selecting targets and carrying out engagement operations, based on the programming on which they are based in executing their combat functions. Autonomy is a technology that enables the machine to perform certain tasks through software commands, with automatic feedback control, to ensure that operations are carried out correctly so that the weapon will be able to operate without any human intervention (Rawbhi Omar,2018,p.175).
2. **Adaptation to surrounding conditions:** Adaptation means the ability to change paths by sensing the surrounding environment, using artificial intelligence techniques that enable it to learn and benefit from experiences through simulation systems and direct experiments, which enables it to address errors without the need for human intervention (Isaac Al-Ashash, 2018,p.159).
3. **Complexity:** Autonomous weapons have a very complex technical nature, and this appears from their mechanism of action, which goes through several stages, starting from perception and sensing, all the way to analysis and processing, and thus making the appropriate decision, and this leads to difficulty in understanding the path that these weapons take to interpret their outputs, and it is also difficult Evaluating those outputs if they depend on high levels of artificial intelligence. Therefore, specialists in the field of artificial intelligence see the possibility of developing algorithms that make the self-operating weapon interpretable, and thus the possibility of determining responsibility for violations that may be based on the programmer, designer, or military commander..... etc (Abd al-Qadir Mahmoud Muhammad al-Aqra,2020,p.912).
4. Lethality: The lethality feature is considered the most important feature that distinguishes autonomous weapons. By lethality, we mean that the behavior of autonomous weapons is isolated from all humanitarian considerations and mercy that a human combatant may enjoy during war, and this feature is considered inherent to the advantage of independence, as the more autonomous weapons increase their independence The more deadly and destructive (Doaa Khalil Hatem,2020,p.20).
5. This feature is also linked to another feature, which is prediction, as it is difficult to predict what the autonomous weapons will do, and thus the weakness and lack of reliability of the actions that these weapons can perform (Isaac Al-Ashash ,2018,p.161).
6. Accountability: Achieving accountability for autonomous weapons is a very complex matter, due to the independence enjoyed by these weapons, making it difficult to determine who is responsible for the damages and violations committed by these weapons. Especially in light of the lack of moral and humanitarian principles in these weapons, these weapons do not have the moral sense and human conscience enjoyed by man (Abd al-Qadir Mahmoud Muhammad al-Aqraa,2020,p.913).

Third, the advantages and disadvantages of autonomous weapons:

Autonomous weapons have many advantages, which made them the focus of attention of many countries and military industry companies, but they have some disadvantages that make them the subject of criticism by international organizations and jurists of international law. Below we will show the most important of these advantages and disadvantages of these weapons.

1. Advantages of autonomous weapons:
   - Speed in sensing and data processing.
   - Increase flexibility and speed in performing tasks.
   - Accuracy in decision-making and selection of goals.
   - Preserving the lives of human combatants.
   - The absence of feelings such as fear, revenge, and self-interest may lead to less harmful outcomes overall (Nathalie Weizmann,2014,p,4).
2. Disadvantages of autonomous weapons:

- They are considered a threat to human life, and the value of human life will diminish if these weapons take decisions to kill and destroy.
- These autonomous weapons may be misused by programmers and terrorist organizations.
- These weapons may pose little danger to their operators, but they pose a real danger to combatants and civilians from enemy forces that do not possess such weapons.
- Autonomous weapons lack human feelings such as compassion.
- The physical and emotional distance between the people who program or deploy these weapon systems may generate emotional apathy under the name "video game mentality" (Ibid., pg. 5).

The challenges raised by autonomous weapons and the difference between them and the human combatant:

There is no doubt that self-propelled weapons are of recent origin, as a law has not yet been established to regulate them and restrict their work, as they still occupy the thinking of the international community, as they raise many dilemmas in the face of the regulators of international law, so it was necessary to clarify the most important challenges raised by these weapons, and then we will explain the difference between them and the human combatant.

First: Challenges raised by autonomous weapons:

Autonomous weapons pose a number of challenges in the application of international law, which has raised the concerns of the international community, because these weapons are designed to carry out purely combat military operations, and are no longer limited to some humanitarian military operations such as aiding the wounded, so we will explain below these challenges, and the opinions of jurists around:

1. **The lack of legal regulation and international rules governing autonomous weapons:** This challenge is represented in the absence of such weapons several decades ago when the legal rules governing the use of weapons during armed conflicts were established. Some jurisprudence believes that autonomous weapons that enjoy complete independence in performing tasks still do not exist at the present time, but there are indications that they can be manufactured in the future with combat capabilities that surpass human combat capabilities, and they will be subject to continuous development (Rawbhi Omar, Ibid,p.176).

   While others believe that the autonomous weapons available in our time enjoy a sufficient degree of independence from the human element, although in the past they were used to detonate explosive devices in the wars in Iraq and Afghanistan, but in the present time these weapons have been developed and made capable of performing tasks Military combat by providing them with various types of weapons according to the mission of each of them, as many countries at the present time have developed and manufactured autonomous weapons of different sizes that enjoy a sufficient degree of independence from the human race, and among these countries are America, Israel, China, Russia, Iran (Marco Sassoli, 2017, pp.135-165), and the information The current availability indicates that human intervention will remain limited to the broader decision-making circle, which includes programming and disabling targeting when necessary, and this confirms that these weapons have a sufficient degree of independence (Malcolm Lockard, 2014, pp.4-7).

   The researcher believes that the second opinion is the most likely and closest to the truth, and the researcher adds that the technological and technical development at the present time has made the weapons self-operating with a great deal of independence, as these weapons can, according to their programming, sense the target and process the data and thus make the appropriate decision, for example, the dome system Israeli-made iron, this system senses hostile missiles from the time of their launch and determines their trajectory, route and location of their fall, and then launches a defensive missile to deal with that missile automatically without human intervention (Iron Dome, 20121). Examples of autonomous weapons that enjoy a sufficient degree of independence include drones, especially suicide planes, such as the Israeli Orbiter plane and the Iranian Shahed plane, both of which have been used in real wars. The previous challenge leads us to another challenge, which is the compatibility of autonomous weapons with the provisions of International humanitarian law and international human rights law. We will explain this challenge in the following point.

3. **Subordination of autonomous weapons to the provisions of international law:** The most difficult challenge produced by autonomous weapons is the extent to which they apply the provisions and principles of international humanitarian law and the extent to which these weapons enjoy moral principles. To clarify this challenge, the jurists were divided into two parts as follows:

   The first trend: Supporters of this trend believe that the development of autonomous weapons in a way that makes them apply the provisions of international humanitarian law is far from certain, at least in the foreseeable future (Parliamentary Union and the International Committee of the Red Cross, 2016, p.79), and they base their arguments on the fact that these weapons are still unable to distinguish between military targets and civilian objects. Even if these weapons are developed and their technology is programmed in a way that makes them able to distinguish between military targets and civilian targets, however, the circumstances of the war at some point may make the

military target a civilian target, and the civilian target a military target, here it is unimaginable that the robot can deal with these dilemma, Also, autonomous weapons do not enjoy the human moral principles that humans enjoy, such as human mercy, because in war you may need human mercy to deal with the wounded and prisoners of the enemy, so the decision to target and kill must be in the hands of the human element and not entirely left to autonomous weapons (Umbrello, Steven, Torres, Phil and Angelo F. De Bellis,2019,p.4).

The second trend: Supporters of this approach believe that it is possible to develop and program autonomous weapons in a way that makes them applicable to the principles of international humanitarian law. These supporters base their opinion on calls made by human rights organizations to use smart and precise bombs as much as possible instead of indiscriminate bombs (Jonathan David Herbach, 2012, p.14). Additionally, supporters of this approach rely on a proposal put forward by a robotics technology expert in 2009, which suggested several technological methods for integrating an ethical code within the programming of autonomous weapons, making them capable of applying the principles and provisions of international humanitarian law (Ronald Arkin, 2009, p.127).

Furthermore, supporters of this approach argue that the lack of human emotions in autonomous weapons gives them an advantage in applying the principles of international humanitarian law. Human fighters are emotionally affected by the circumstances of the battle, which may lead them to commit actions and crimes prohibited by the provisions of international law. Also, emotional and physical pressures that human fighters are subjected to can affect their performance during the battle, and thus affect the accuracy of their shots. Therefore, the absence of human emotions in autonomous weapons will enable them to perform tasks with precision and perfection, according to the tasks assigned to them, and thus respect the principles of international humanitarian law(Umbrello, Steven, Torres, Phil and Angelo F. De Bellis, Ibid,p.4).

The researcher believes that autonomous weapons algorithms can be developed to incorporate programming that assists them in applying the principles of international humanitarian law and ethical principles of warfare, provided that the final decision to attack the target is left to the human operator's discretion. This will lead to accuracy in the application of humanitarian and ethical principles. On the one hand, autonomous weapons will select and identify targets accurately, but the decision to target will be in the hands of the human element. In this case, we have combined the application of humanitarian principles of international law by autonomous weapons and the application of ethical principles of warfare by making the final targeting decision in the hands of the human element. It should not be overlooked that in this case, the programming of autonomous weapons should include the rejection of targeting civilian objects, even if the human operator decides to target them.

Second: The difference between autonomous weapons and human combatants:

By extrapolating the above, the researcher can distinguish between autonomous weapons and human combatants as follows, where autonomous weapons can be defined as a weapon system that relies on artificial intelligence technology using advanced algorithms that help it sense targets and analyze information and data received from the surrounding environment in a way that helps Accurately choosing its objectives, and thus making the appropriate decision to deal with it, all without the need for full or partial human intervention.

On the other hand, a human combatant can be defined as a person who fights and carries out military tasks manually, and has the ability to adapt, think strategically and make decisions in changing circumstances, and can interact with humans effectively, which gives him a moral and emotional advantage in some cases.

From the previous introduction, the researcher can clarify the differences between autonomous weapons and human combatants as follows:

1. **In terms of nature: the** human combatant has the ability to think, make decisions, and adapt to changing conditions in the field, while autonomous weapons are programmed to carry out specific tasks without human intervention.
2. **In terms of experience and training:** the human fighter needs years of training and experience in combat and military operations to develop the skills necessary to confront the enemies, While autonomous weapons do not need this training, they are programmed to carry out their tasks with great accuracy.
3. **In terms of the ability to adapt:** the human fighter can adapt to different circumstances and deal with difficult situations, while autonomous weapons do not have the ability to adapt to changing conditions unless they are specially programmed for this purpose.
4. **In terms of cost**: Autonomous weapons are more expensive than a human combatant, due to the advanced technology and programming required to operate and develop them continuously, while training and arming a human combatant is less expensive.
5. **Independence**: Autonomous weapons enjoy a great deal of independence in performing their tasks, as they are not subject to the orders of any military commander, which makes it easier to perform their tasks more quickly, while the human combatant does not enjoy a sufficient degree of independence, as he is still subject to the orders of his military commander in performing his duties. Therefore, the completion of the task requires more time.
6. I**n terms of ethical principles**: Autonomous weapons pose great challenges in terms of their ability to adhere to ethical principles, with their ability to make the right

decisions independently, While the human combatant has the ability to think and judge the situation independently and to ensure the validity of the specific goals before carrying out any military operations.

7. **In terms of responsibility:** The international responsibility for violations of autonomous weapons rests with the manufacturers, programmers, operators, and commanders who control and decide to use them, while the human combatant bears full responsibility for his decisions and actions on the battlefield.

The role of international law in regulating autonomous weapons:

Autonomous weapons, like the weapons that preceded them, will contribute to changing the course of war, as they will continue to evolve to reach complete autonomy from humans, and this is the ultimate goal for their developers. Autonomous weapons lack international legal rules of their own that regulate their work in accordance with the provisions and principles of law Therefore, there are difficulties in interpreting and applying the rules and principles of international humanitarian law to autonomous weapons, where these difficulties are represented in whether the current legal rules are clear enough, or do we need to interpret international humanitarian law, or develop new rules that deal with these challenges (ERIN A. MCDANIELK, 2012, p.24).

autonomous weapons represent a complex legal challenge in terms of the possibility of subjecting them to the Geneva Conventions of 1949, especially since these agreements stipulate the need for an accurate definition of weapons, and they did not distinguish between weapons and methods of war, yet Article (36) of the First Additional Protocol of 1977 AD stipulated that: When studying, developing, or acquiring a new weapon or tool of war, or adopting a method of war, the parties must verify whether it is prohibited in all or some cases by the provisions of this protocol or any rule of international law to which the parties are bound (First Additional Protocol to the Geneva Conventions of 1977). Based on the foregoing, and since autonomous weapons are not subject to any international legal rules so far, they must be subject to the general principles of international humanitarian law, so we will explain in this section the extent to which autonomous weapons comply with the principles and provisions of international humanitarian law, and then we will explain who is criminally responsible On violations of autonomous weapons of the provisions of international law.

The extent to which autonomous weapons comply with the principles of international humanitarian law:

The difficulties facing international law are the extent to which autonomous weapons can automatically distinguish between military targets and civilian objects, between active combatants and those hors de combat, and whether autonomous weapon software can actually be developed to detect and assess changing conditions and determine what an attack might cause. Incidental losses among civilians and damage to civilian objects, or both, as required by the rule of proportionality, in addition to the challenge related to the ability to program the weapon to cancel or suspend the attack if it appears that the target is not military or enjoys special protection, or that it is expected to violate the attack. The principle of proportionality (Parliamentary Union and the International Committee of the Red Cross, Ibid,p.78), in the following we will explain the extent to which autonomous weapons are able to apply the principles of international humanitarian law:

1. The principle of distinction: The principle of distinction is based on two main components, the first is that the parties to an armed conflict must be able to distinguish between civilians and combatants, and the second is that the parties to the conflict must be able to distinguish between civilian targets and military targets, so the principle of distinction is considered the basic pillar of the two additional protocols to the conventions Geneva of 1977, where Article (48) of Additional Protocol I stipulates that “the parties to the conflict shall strive to distinguish between the civilian population, combatants, civilian objects, and military objectives, and then direct their operations against military objectives only" (Hisham Bashir Zabrahim Abed Rabbo Ibrahim,2021,p.112).

   The principle of discrimination appears in the phenomenon of a simple enough rule, which is either that the potential target is civilian or military, but in fact, the analysis required to apply the principle of discrimination is very complex and only the human mind enjoys that analysis, but the controversial extent of the ability of self-operated weapons to enjoy the same The ability of the human mind to apply the principle of discrimination during armed conflicts, especially in conflicts that are not harmonious. For example, can autonomous weapons distinguish between a farmer who is digging a trench and a fighter who is planting an explosive device. In this context, three main concerns have been identified related to the ability of autonomous weapons to Distinguishing between military and civilian targets, which is either that autonomous weapons are weak in perception and discrimination, or that autonomous weapons may have difficulty interacting with environmental changes, or that autonomous weapons may suffer from a weakness in their programming (David Gutierre,2015,p.29).

   With regard to the first problem and challenge, opponents of the use of autonomous weapons see that these weapons cannot clearly and explicitly distinguish between combatants and civilians (Cecilie Hellestveit, 2014, p.124), while supporters of the use of autonomous weapons believe that to bypass this problem, autonomous weapons can be programmed to fire only when they are attacked. In addition to limiting the use of autonomous weapons to situations in which the hostile force is declared clearly and explicitly, and there are those who believe that it is possible to program autonomous weapons to be able to target the weapon only instead of targeting the soldier who carries the weapon, and

therefore the human injury will be such as Collateral damage (David Gutierre, Ibid,p.31).

With regard to the second problem, opponents believe that autonomous weapons are difficult to restrict their scope of thinking, to determine whether the target is relevant to the battle and war or not, especially if The environment for the battle is open and ambiguous, as this matter may lead to a misinterpretation of information by autonomous weapons, and thus lead to an indiscriminate attack prohibited by international law (Armin Krishnan,2009,p.99), and this problem has to do with the text of Article (50) of the First Additional Protocol of 1977, which states that the attack It would be illegal if there was a lack of certainty about the legitimacy of the target. On the other hand, proponents of autonomous weapons argue that as long as human programmers can reasonably program the question of the target's nature by introducing certain algorithms, autonomous weapons will not violate the principle of discrimination, as they can. Programming an independent system within the autonomous weapons according to the principle of do no harm, which would prevent the use of lethal force if the target is not classified correctly (Schmitt, M, 2013, p.16).

With regard to the third problem, opponents of autonomous weapons believe that the more complex the weapon's programming becomes, the more difficult it will be to predict it, and thus affect its full treatment. This problem may cause autonomous weapons to use lethal force indiscriminately as a result of an unexpected error in their programming. In addition, even if these weapons have smart programs and sensors, they will not be able to interpret and understand human intentions and emotions (Peter Asaro, 2012, pp.687-709 / Yoram Dinstein, 2012, pp. 261-277). On the other hand, supporters of autonomous weapons see that the issue of programming autonomous weapons can be bypassed through the continuous and steady development and periodic follow-up of autonomous weapons.

At the end of our review of the ability of autonomous weapons to apply the principle of discrimination, the researcher believes that it is possible to program autonomous weapons and provide them with algorithms to make them fire only in the event of an attack, or in the event that the enemy is clearly and explicitly visible,

In addition, it can be used only when the battle rages or what is called "killing squares". In these areas, it is almost impossible to have any notables.

These weapons can also be equipped with algorithms that help them identify and accurately distinguish between a military target and a non-military target, with continuous follow-up by the developers of these weapons to update their software periodically to ensure that these weapons do not commit any indiscriminate attack, at the same time the researcher recommends if these weapons are used in Assassinations or attacks The final decision must be in the hands of the human operator, in order to ensure that ethical standards are met and that human intentions and emotions are correctly and accurately understood and interpreted.

2. The principle of proportionality: This principle means that the expected harm to civilians must be measured before carrying out any attack compared to the military advantage that can be achieved. This provision has been mentioned in many international agreements. It was stipulated in the St. Petersburg Declaration of 1868 (Omar Al-Zamali, 2010, p.163), As stipulated in the Hague Regulations related to the laws and customs of land war of 1907 AD, which stipulated that “the belligerents do not have an absolute right to choose the means of inflicting damage on the enemy" (the Hague Regulations Concerning the Laws and Customs of Land War of 1907, Article 22)., The International Court of Justice also adopts this principle in the case of military and paramilitary activities between Nicaragua and the United States of America, where the International Court of Justice rejected the claim of the United States that what it did was collective self-defense in accordance with the Charter of the United Nations, and during its discussion of the various circumstances that justify cases of self-defense The Court recognized the principle of proportionality as a well-established principle of customary international law (Summary of Judgments, Fatwas, and Orders Issued by the International Court of Justice 1948-1991, p.212)).

   This principle is considered one of the most complex principles in international humanitarian law, especially in light of the presence of autonomous weapons, as this principle is closely related to personal assessment and the context of the circumstances of the field conditions of combat operations, and therefore any defect in the element of appreciation for autonomous weapons, and any complexity of circumstances and circumstances. Operations, which could lead to undesirable and unexpected behavior with serious consequences (Noel Sharkey, 2007, p.123), and the United Nations Special Rapporteur, Christoph Heinz, indicated that autonomous weapons have far-reaching effects on social values, mainly including the protection of life and its value, and international stability and security, and that it is not clear At the present time, the extent of the ability of these weapons to meet the conditions stipulated in international humanitarian law and international human rights law in many respects, with the possibility of expecting that this compliance will be achieved in certain circumstances, especially if they are used side by side with humans (United Nations: Report of the Special

Rapporteur on extrajudicial, summary or arbitrary executions,2013,p.30).

Specialists believe that in theory, the self-weapon can be programmed to comply with the principle of proportionality by programming the algorithms of the weapon, as it analyzes the principle of proportionality on its own, but in practice, if the humans themselves are sometimes unable to estimate whether the attack is proportionate or not. How can a programmer set up a self-propelled weapon that evaluates the proportionality principle (Kelly Cass,2015,p,16)?

Therefore, the researcher believes that it is almost impossible for autonomous weapons that are completely independent of humans to be able to apply the principle of proportionality. Therefore, the researcher believes that if the battle is raging, i.e. the entire combat area becomes military, then the issue of proportionality cannot be raised or not with regard to autonomous weapons. In cases other than the previous case, such as assassination, the control of the final decision of the killing process or targeting by the self-powered weapon must remain in the hands of the human element.

3. The principle of precaution: Article (57) of Additional Protocol I to the Geneva Conventions of 1977 stipulates that those who carry out military operations must take constant care to spare the civilian population and civilian objects from military operations, with the aim of minimizing accidental loss of civilian life and damage. damage to civilian objects, as the attack must be canceled or suspended if it becomes clear that the target is not military, enjoys special protection, or violates the rule of proportionality, and advance warning of attacks that may affect the civilian population must be given whenever circumstances permit, and when it is It is possible to choose between several military targets that would achieve the same military advantage, so the target that is least harmful to individuals and civilian objects must be attacked (CURTIS R . MICHAEL, 2019, p.65).

Opponents of autonomous weapons believe that it is illogical to believe that autonomous weapons can comply with the principle of caution while managing several different and unexpected scenarios, as the inability of autonomous weapons to do so would conflict with their ability to comply with the principle of proportionality, and in such complex circumstances. Autonomous weapons cannot explain the different scenario and thus the ability to deal with it. For example, if the autonomous weapons determine the presence of a military commander in the capital of a country, and as it is known that the capital is crowded with civilians and the movement of civilian cars and bicycles, then the conditions will be constantly changing. Will the autonomous weapon be able to deal with these changing conditions and apply the principle of precaution? Can the weapon also evaluate the expected military advantage when attacking that target compared to the civilian damage (Asif Khan Turlandi, 2022, pp. 30-31)?

On the other hand, supporters of autonomous weapons believe that this principle addresses those who plan and order the attack, i.e. it addresses humans, and therefore there is nothing to prevent taking these precautions by humans as they are the ones who program the autonomous weapons and provide them with orders, meaning that the final decision to attack or not is in the hands of the operator human (Doaa Jalil Hatem, Ibid,p.290).

In the opinion of the researcher, we must not lose sight of the fact that autonomous weapons enjoy great accuracy in selecting targets and targeting them, and this makes them among the accurate weapons that differ in all their characteristics from random weapons that depend in their entire operation on the human element, such as improvised missiles, so it must be kept On the work of autonomous weapons within battles and military operations, provided that the final decision remains in the hands of the human operator because he is more capable of dealing with different scenarios and surprises.

4. The principle of military necessity: This principle means that the parties to the conflict must use the appropriate amount of weapons and force to achieve a military advantage, with the least losses in lives and equipment, in order to achieve a balance between military necessity and humanitarian considerations. More than achieving this goal is considered violence that may amount to an act of atrocity (the First Geneva Convention for the Protection of the Wounded, Sick, and Soldiers in Land War, Article 50/ the Third Geneva Convention for Prisoners of War 1949, Article 51).

Opponents of autonomous weapons believe that programmers of autonomous weapons must address the issue of capturing and arresting legitimate targets rather than killing them. In addition, it is difficult for autonomous weapons and it may be impossible for them to have the ability to estimate military necessity, given that this principle is closely linked to intellectual capabilities human beings (Marco Sassoli, 2017, p.156), On the other hand, supporters of autonomous weapons believe that the principle of using these weapons is only out of military necessity (Doaa Jalil Hatem, Obid, p.64).

The researcher believes that autonomous weapons can effectively apply the principle of military necessity, due to their enormous and advanced technological capabilities that enable them to choose the target and target it accurately， At the same time, this does not preclude a margin of error. Therefore, the selection of the target, its identification, and the selection of the appropriate weapon to destroy it must be by the self-powered weapon based on its prior programming, and the final decision to target and destroy the target remains in the hands of the human operator.

5. Martens clause “the principle of humanity”: This principle means the protection of human dignity in all circumstances, including time of war. It is not possible to talk about international humanitarian law without referring to this principle. This principle was mentioned in the preamble to the Fourth Hague Convention of 1907, as well as in Article 1 of The Protocol annexed to the four Geneva Conventions of 1977 states: “Civilians and combatants in cases not stipulated in this annex or any other international agreement shall remain under the protection and authority of the principles of international law as established by custom, the principles of humanity, and the dictates of public conscience.” This principle is considered the essence of the theory of war. Just, which aims not to cause more suffering than is necessary to achieve its end, and this condition is also linked to the principle of humanity and both lead to the same meaning, which is the prohibition of inflicting pain, injury or destruction that is not actually necessary to achieve legitimate military objectives (Nils Melzer, 2010, p.79).

Opponents of autonomous weapons believe that these weapons are unable to meet the requirements of humanity because they lack human feelings, such as sympathy, fear, and anger, and they cite the survey conducted by Arkin in his research on the acceptability of using these weapons among the public, decision-makers, researchers and military personnel, and the result was that "the more Human oversight of weapons diminishes as their reliability diminishes" (Isaac Al-Ashash, 2018, p.165), While supporters of autonomous weapons argued that these weapons are able to apply the principles of humanity better than humans by programming and providing them with algorithms capable of making them enjoy the feelings that humans enjoy, but that they will be more ethical than humans themselves Ronald Arkin, 2009, p.211).

The researcher believes that it is indispensable to use autonomous weapons at the present time, especially because of their advantages and characteristics that humans do not enjoy, but at the same time these weapons may not have some of the characteristics that humans enjoy, and therefore each of them is complementary to the other. Thus, it is possible to program autonomous weapons and provide them with algorithms that make them capable of applying humanitarian principles, and at the same time the final decision to destroy the target is in the hands of the human operator, and as a result of the lack of special international legal rules to regulate such weapons, the question remains:

What are the international legal rules and restrictions that can be applied to autonomous weapons in the absence of special rules regulating them?

It is agreed that autonomous weapons are not regulated by any special international legal treaties, however, this does not mean that they are not subject to the provisions of international humanitarian law regulating armed conflicts, especially those general rules that apply to the various types of weapons that are regulated by any special agreements and these are represented The provisions are as follows:

- The Hague Conventions of 1899 and 1907: These conventions regulate the means and methods of war.
- The Geneva Conventions of 1994: These conventions seek to provide special protection for war victims such as the wounded, sick, and prisoners of war, and to protect civilian objects.
- The Additional Protocols of 1977: These two protocols work to achieve convergence between the Hague Conventions and the Geneva Conventions by updating and including everything related to the organization of war in one document.
- Other agreements that regulate weapons, such as the United Nations Convention on Conventional Weapons of 1980: where this agreement prohibits or restricts the use of certain conventional weapons, and it also applies to weapons not included in the Convention, and this agreement includes some provisions that apply to weapons Self-operating (CURTIS R . MICHAEL, 2019, pp. 25-26), below we will explain the most important restrictions that autonomous weapons must be subject to in light of the provisions of international humanitarian law.

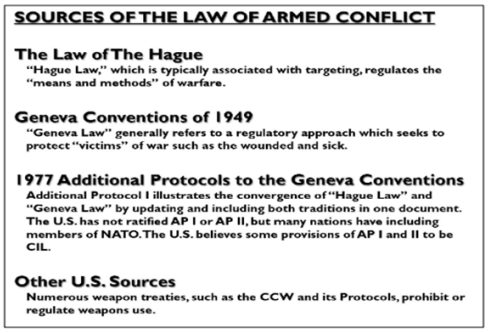

Figure 2. Sources of the Law of Armed Conflict

Source: Created by the author with data from JAG 2018.

1. The prohibition of the use of weapons that cause undue suffering: The International Court of Justice defined the rule of the prohibition of undue suffering in its 1996 advisory opinion on the legality of the use or threat of nuclear weapons as “The humanitarian rule that prohibits the use of warfare means and methods that cause human tragedies and pain that exceed the legitimate purpose of war or exceed legitimate military objectives", This rule is based on the criterion of prohibiting suffering that exceeds the purpose of destroying or disabling the military target Laith Al-Din Salah Habib Al-Bajlani, 2006, p.61). Some believe that autonomous weapons do not violate this rule, although some cases may arise in which the autonomous weapons causes unjustified pain, as this weapon enjoys extreme accuracy in choosing its target. And shooting at it, and with the passage of time it will become more discerning and accurate than humans

in terms of defense and attack (Kenneth Anderson & Matthew C. Waxman, 2013, p.14).

2. Prohibition of indiscriminate weapons: Article (51) of the First Additional Protocol of 1977 provided for the cases in which weapons are considered indiscriminate, as follows:

- Those that are not directed to a military target.
- Those that use a method or means of fighting cannot be directed at a military target.
- Those that use a method or means, the effects of which cannot be limited as required by this Protocol, and are liable to strike military objectives, persons, and civilian objects indiscriminately.
- Bombing attack, whatever the methods or means, which deals with a number of military targets located in a city, town or village that includes a number of people and civilian objects as one military target.
- An attack that is expected to cause loss of civilian life, injury to them, or damage to civilian objects, disproportionate to the military advantage achieved by the attack.

It should be noted that the rule of banning weapons with indiscriminate effects is a customary rule, which was not mentioned except in the treaty text mentioned in the first protocol of 1977, which was not ratified by all countries (international Committee of the Red Cross, 2016, p.2), and if we want to apply this rule to autonomous weapons, then this rule is inconsistent with the most important characteristic of weapons It is self-operating, which is accuracy in hitting and selecting targets, Autonomous weapons have artificial intelligence consisting of several advanced algorithms and accurate programming that makes them able to choose targets accurately, aim at them, and also hit them accurately, without resulting in any harm inconsistent with the rule of banning indiscriminate weapons, and therefore the rule of banning indiscriminate weapons does not apply to autonomous weapons. Due to the advantages that the latter has previously mentioned.

3. Reviewing weapons according to the text of Article (36) of the First Additional Protocol of 1977: The previous article obligates the contracting parties to study, develop, acquire or adopt a new weapon, means, or method of warfare, by ascertaining whether the use of this weapon in some or all circumstances is prohibited under the provisions of this Protocol or under any rule of international law applicable to the Parties, and all Parties must perform this obligation in good faith, The issue of whether this rule is customary or not and therefore can apply to countries that are not party to this protocol is still being debated by jurists of international law (vincent boulanin, laura bruun and netta goussac, 2021, p.9).

To conduct this review, it is necessary to have full knowledge of the capabilities and characteristics of the weapon and to predict its effects, through verification and testing by the commander or operator, and an assessment of the legality of the attack using this weapon, and the legal review also requires a high level of confidence, which is that the weapon will work predictably and reliably As required (Neil Davison, 2017, p.9), and in 2006 the International Committee of the Red Cross prepared a legal review guide for new weapons, means and methods of war, to assist countries in establishing mechanisms for reviewing new weapons by improving national procedures to determine the legality of new weapons being developed and possessed (Gilles Giacca, Ibid, p.103).

In view of the aforementioned article, it becomes clear to us the most important challenges facing autonomous weapons with regard to conducting the review in accordance with Article (36), which are as follows:

- The extent to which the weapon's algorithms are programmed in order to match the legitimate target with the instructions provided by the weapon in advance.
- Weapon sensor mechanism.
- Environment and deployment time (Fredrik Von Bothmer, 2018, p.56).

The meetings of conventional weapons experts on autonomous weapons between 2014-2016 also resulted in two commitments that a country planning to purchase or manufacture an autonomous weapon must implement, which are the following:

- A legal review before deciding to start purchasing, developing, or manufacturing an autonomous weapon.
- A legal review before sending the self-propelled weapon to the battlefield (Erika Steinholt Mortensen, 2016, p.64).

The foregoing shows us the most important restrictions that autonomous weapons must be subject to, and I believe that these restrictions do not conflict with the production or development of autonomous weapons, especially as a result of the technological progress and artificial intelligence enjoyed by these weapons that make them have advantages that humans lack. These advantages may make autonomous weapons comply with the previous restrictions more than the human fighter, but in all cases I stress that the final decision to attack and target must be in the hands of the human operator and not left to the autonomous weapons.

Criminally responsible for violations of autonomous weapons:

The novelty of the issue of autonomous weapons, and the lack of international legal rules regulating their work, made the problem of international criminal accountability for violations committed by these weapons a matter of contention in the jurisprudence of international law. This problem was raised by researcher Nick Bostrom in 2014, where he said that if the weapons reach To a certain level of intelligence to the point of making decisions on its own, it will be difficult to impose the rules of accountability, as a result of this a real problem arises, as the machine does not have a moral agency, and therefore it is impossible to hold it responsible for its illegal actions (Nick Bostrom,2014), so the researcher will

explain in this study who is criminally responsible For violations of autonomous weapons of the provisions of international humanitarian law.

Firstly/ autonomous weapons:-

By extrapolating the rulings of temporary international criminal courts such as the Nuremburg Tribunal, and the provisions of the Rome Statute, it is impossible for a self-priming weapon to be criminally responsible before the International Criminal Court, Article (25) of the Rome Statute stipulates that the court's jurisdiction is not over natural persons (Eugene Holstein,2022,p.31), and Article (30) of the Rome Statute also stipulates that a person is not criminally liable if he is not aware of the act he is doing and the result that may result on this act (the Rome Statute of the Permanent International Criminal Court,2002, Article 30), Thus, the self-operating weapon is not considered a natural person, nor can he be aware of the consequence of his action because he does not really understand the impact of his behavior, as stated in the Nuremburg trials that "crimes are committed by human beings, not by mysterious entities, And they alone bear the penalty for their crime until it is guaranteed that these crimes will not be repeated" (Judgment of Nuremberg International Military Tribunal,1947,p.41). It is known that self-propelled weapons do not have any emotions, feelings, or intention to carry out the attack, and therefore they lack the criminal intent that must accompany the perpetrator of the crime, as confirmed in the final report issued According to the Group of Governmental Experts, no legal personality can be granted to autonomous weapons, and by mentioning all the previous evidence, it is not logical that the self-operating weapon is subject to international criminal responsibility(The Nest Isaac, 2018, p.47).

The question remains, if an autonomous weapon is not envisaged to be subject to criminal liability, who should be held accountable when an autonomous weapon fails to comply with the provisions of international humanitarian law?

Secondly/ The programmer (designer) of the weapon:-

Since the jurisdiction of the International Criminal Court is only over natural persons, a question arises about the possibility of holding the designer or programmer of the self-propelled weapon accountable, and in view of the text of Article 25 of the Rome Statute, which says every natural person who committed a crime in his individual capacity or in association with another, or Aiding, abetting, assisting..., or contributing in any other way with the aim of furthering criminal activity or criminal purpose..", This text is interesting and suggests to us the possibility of achieving international criminal responsibility for the violations of autonomous weapons by placing it on the programmers of those weapons as responsible for participating in the commission of these violations, but how can the court interpret this text, explain its accusation and clarify the type of this responsibility, since these matters An important role in determining the penalty to be decided by the court for those who incited and assisted in the commission of these violations.

Judicial jurisprudence considers that every participant in the crime by any means is considered to be in the same legal status with respect to the main offender, as long as the actions of the individuals fulfill all the elements of the material element constituting the crime, but the issue of the moral element (criminal intent) remains, and this is another problem as it is difficult to prove criminal intent in The use of autonomous, autonomous weapons remained completely independent of humans, and whatever the role played by the participant in the crime, the joint criminal project requires proof of three elements, which are the following:

- A number of individuals were involved in the commission of the crime.
- A common goal of committing or participating in a crime.
- Active participation or participation in the commission of the crime (Isaac El-Achash & Salma Sassi, 2020, p.378).

f these elements are achieved by programmers and designers, they can be subjected to international criminal responsibility for crimes committed by autonomous weapons.

Another aspect of jurisprudence considers that it is inconceivable that international criminal responsibility for crimes committed by autonomous weapons will be imposed on the programmers or designers of those weapons because the nature and complexity of autonomous weapons will make it difficult to determine who is personally responsible of the programmers for these violations, This is because the introduction and writing of algorithms is not done by a single programmer, but rather by a large number of programmers, each according to his competence. The interactions between a group of algorithms that are introduced by a large number of programmers may lead to unexpected interactions within the weapon and thus reach unexpected results and not desirable, It is therefore unlikely that a criminal court would assign responsibility to a programmer whose small piece of code, which may have been designed for more general than military purposes, caused an unexpected conflict within a huge code library provided for the self-propelled weapon, causing the weapon to behave in an inappropriate manner, expected and dangerous (Jarna Petman, 2017, p.45-47).

Thirdly/ The operator of the self-propelled weapon "the commander":-

A part of international jurisprudence believes that international criminal responsibility resulting from violations of autonomous weapons can be attributed to the commander, in accordance with Article (28) of the Rome Statute, which stipulates cases in which the commander is criminally liable, as follows:

- If the crimes within the jurisdiction of the Court were committed by forces under his effective command and control, as a result of his failure to properly exercise control over those forces.
- If the commander knows or should know that the forces are committing or about to commit one of the crimes stipulated in this charter.
- If the commander did not take all necessary and reasonable measures within his power to prevent or suppress the mission of those forces or did not submit the matter to the competent authorities for investigation and prosecution (

Rome Statute of the Permanent International Criminal Court, 2002, Article 28).

It is clear from the foregoing that the commander can bear international criminal responsibility for violations committed by persons under his command, so it was proposed to expand the concept of persons under his command to include autonomous weapons, This is logical, as the Director of International Law and Cooperation of the International Committee of the Red Cross commented on that, that there must be a person responsible for operating these weapons, in order to overcome the dilemmas and problems raised by these weapons, and it is preferable that this person be a relatively high-level leader (Dr Philip Spoerri, 2011).

At the end of our review of the last part related to this study, which aims to determine who is criminally responsible for the violations committed by the autonomous weapons, the researcher believes that the opinion closest to correctness and logic is the last opinion that considers the commander or operator to be criminally responsible for the violations of the autonomous weapons, for several considerations, which is that the leader is a natural person and has awareness and therefore this is compatible with the provisions of the Rome Statute, In addition, the text of Article 28 of the Charter came clearly in considering the commander responsible for the actions of the fighters who work under his responsibility, and since the autonomous weapons have not yet reached complete independence, this means that they are still subject, albeit in a simple way, to the decisions and orders of the commander (operator).

Conclusion:-

In this study, we have dealt with the international regulation of autonomous weapons, As it appeared to us that the subjects of international law have not yet agreed to apply certain rules to autonomous weapons or to conclude a special international agreement that includes provisions and rules to regulate the work of autonomous weapons, This is due to the novelty of this topic, in addition to the complex nature of autonomous weapons. Therefore, the opinions of jurists, international organizations, and countries also differed about whether or not to prohibit the use and development of autonomous weapons, due to the risks and challenges posed by these weapons in the face of the application of the provisions of international law, especially the principles and restrictions of humanitarian international law. Therefore, the researcher recommends the necessity of coordinating efforts between persons of public international law, especially the United Nations Organization and the International Committee of the Red Cross, with the aim of concluding an international treaty that includes provisions regulating the work of autonomous weapons. The researcher also recommends keeping work on autonomous weapons in battles, but on the condition that the final decision related to targeting and killing remains in the hands of the human operator and is not completely left to autonomous weapons, The researcher also recommends not banning autonomous weapons with complete independence that perform humanitarian and defensive tasks, such as those robots that provide first aid to fighters during battle, as well as missile and air defense systems, in addition to robots that contribute to providing supplies to the armed forces in the field, whether food or military supplies.

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